INFECTION CONTROL PRACTICES IN THE DENTAL LABORATORY

Updated 9/04

INTRODUCTION

- Infection control (IC) is an essential part of dentistry
- Potential for disease transmission in the dental lab is well documented
- Potential pathogens can be transported to lab via orally soiled impressions, dental prostheses/appliances
- Microorganisms can be transferred from contaminated impressions to dental casts
  - Oral bacteria can remain viable in set gypsum for up to 7 days

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EXPOSURE

- Lab personnel may be exposed via
  - Direct contact (through cuts and abrasions)
  - Aerosols created during lab procedures
    - Inhaled or ingested
- Patients can be at risk due to potential cross-contamination between dental prostheses/ appliances
- Potential for cross-contamination from dental office to lab and back to dental office

EXPOSURE

- Potential infection can be transferred in lab from case to case
  - By surface contact, handpieces, burs, pumice pans, aerosolization, dust/mist, unwashed hands

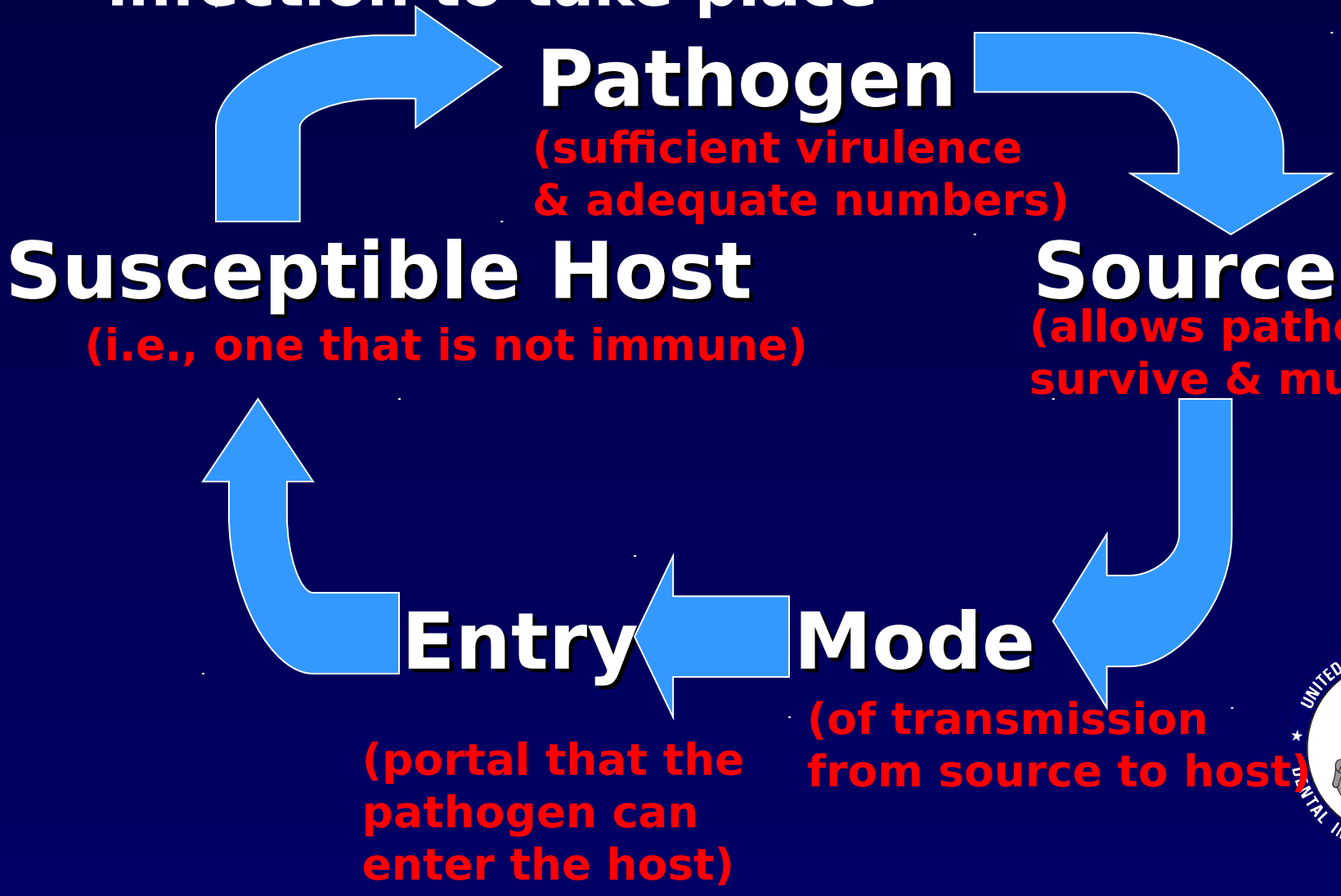
CROSS-CONTAMINATION

- Passage of microorganisms from one person or inanimate object to another
  - Aseptic techniques* must be implemented to reduce occurrence

    *Procedures that break the chain of infection to reduce cross-contamination
- Dentists and lab should establish IC protocol for incoming and outgoing cases

CHAIN OF INFECTION

- All links must be connected for infection to take place



GOALS/ACTIONS

- Strive to make dental lab as safe as possible
- Minimize potential for disease transmission via
  - Immunizations
  - Barrier techniques
  - Aseptic techniques
- IC compliance
  - Adhere to Standard Precautions (SP)
  - Establish written IC policy

STANDARD PRECAUTIONS

- Must be observed in the lab at all times
- Are used by all lab personnel to prevent cross-contamination by dental items entering lab
- All patients are treated as if they could transmit a bloodborne pathogen (BBP) disease
  - Examples include hepatitis B, hepatitis C, and human immunodeficiency virus (HIV)

REQUIREMENTS

- Lab is responsible to comply and enforce all federal, state, and local regulations that affect its operations and employees
  - Includes the Occupational Safety and Health Administration's (OSHA) BBP Standard
- All lab personnel
  - Must be included in exposure determination
  - Must be offered hepatitis B vaccine
  - Must be given annual BBP training

IC POLICY

- Written
  - Should be precise, concise, and easy to understand
- Dynamic process
- Reviewed annually and updated whenever necessary
- Cover occupational exposure incidents
  - Individual must be provided with counseling, post-exposure evaluation, and follow-up

BASICS OF LABORATORY IC

- Need coordination between dental office and lab
- Use of proper methods/materials for handling and decontaminating soiled incoming items
- All contaminated incoming items should be cleaned and disinfected before being handled by lab personnel, and before being returned to the patient

COMMUNICATION

- Is essential between lab and dental office
  - To ensure proper procedures are followed
- Concerning IC protocols
  - Clearly describe requirements for case submission
  - Specifically delineate responsibilities
    - Personnel must understand the proper steps to ensure disinfection of materials entering lab
    - Reason: to prevent duplication of disinfection protocol, and to prevent potential lab contamination
    - If uncertain on status: disinfect by prescribed methods

“BARRIER” SYSTEM

- Is most effective, practical method for preventing cross-contamination
- Is a series of physical cleaning procedures to reduce organic debris and microorganisms on intraorally soiled dental items
- Accomplished through step-wise process of mechanical and chemical cleaning and disinfection
- Results in a product that can safely be handled by lab personnel without need for personal protective equipment (PPE)

BARRIERS

- Include
  - Handwashing with plain or antimicrobial soap (or an alcohol-based hand rub if hands are not visibly soiled)
- Use of PPE when there is potential for occupational exposure to BBPs
  - Examples
    - Gloves
    - Mask
    - Protective eyewear, chin length face shield
    - Protective clothing (i.e., lab coat/jacket)

GLOVES

- Disposable gloves
  - Use when there is potential for direct hand contact with contaminated items
  - Should be changed and disposed of appropriately after completion of procedure
  - Hands should be washed before gloving and after removing gloves
- Utility gloves
  - Should be used when cleaning/disinfecting equipment/surfaces

MASK/PROTECTIVE EYEWEAR/CLOTHING

- Must be used when there is potential for splashes, spray, spatter, or aerosols
  - Examples: when operating lathes, model trimmers, and other rotary equipment
- Lab coat/jacket should be worn at all times during fabrication process
  - Change daily
  - Do not wear outside of the lab
  - Launder appropriately

UNIT-DOSE CONCEPT

- Purpose: to minimize cross-contamination
- Refers to dispensing of amount of material(s) sufficient to accomplish a particular procedure, prior to patient contact
- Dispose of excess material(s) at completion of procedure

CHEMICAL DISINFECTANTS

- Two functions
  - Must be an effective antimicrobial agent
  - Must not adversely affect dimensional accuracy or surface texture of impression materials and resulting gypsum cast
    - Want to reduce likelihood of ill fitting, nonfunctional prostheses

CHEMICAL DISINFECTANTS

- All employees must be properly trained to handle these materials in accordance with OSHA's Hazard Communication Standard
- Disinfectant must have an Environmental Protection Agency (EPA) registration number
- Must have at least intermediate-level of activity
  - Tuberculocidal, hospital-grade

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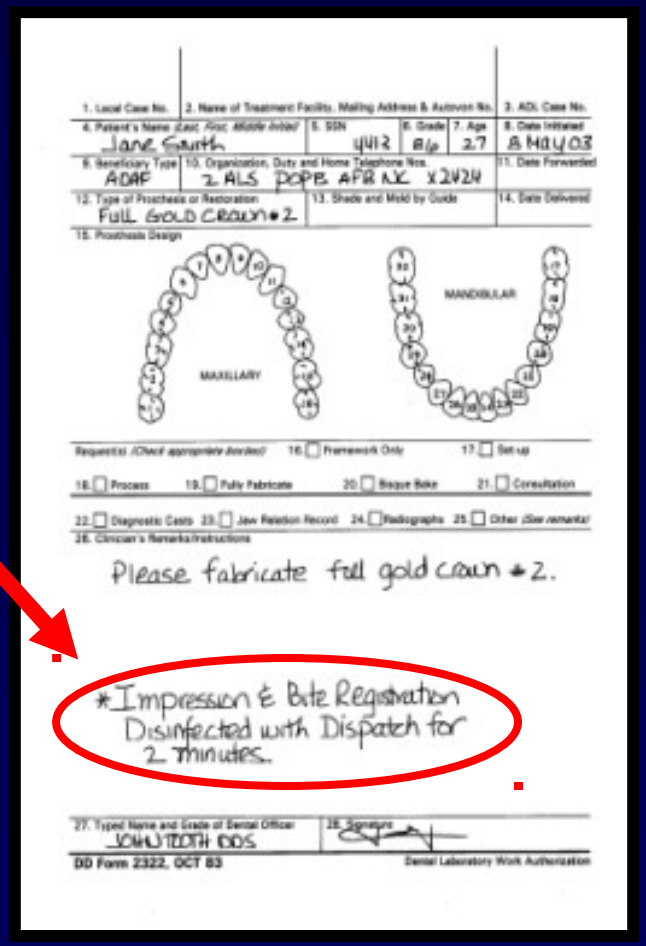
DENTAL LABORATORY

- All disinfection procedures are accomplished prior to delivery to lab
  - Done in dental operatory or professional work area
- Recommend a sign and monitor system be implemented stating *“Only Biologically Clean Items Permitted”*

INCOMING ITEMS

- Rinse under running tap water to remove blood/saliva
- Disinfect as appropriate
- Rinse thoroughly with tap water to remove residual disinfectant
- No single disinfectant is ideal or compatible with all items
- Annotate the DD Form 2322: ***"Disinfected with _____ for _____minutes"***



OUTGOING ITEMS

- **Clean and disinfect before delivery to patient**
- **After disinfection: rinse and place in plastic bag with diluted mouthwash until insertion**
- **Do not store in disinfectant before insertion**
- **Label the plastic bag: *“This case shipment has been disinfected with _____ for ____ minutes”***

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IMPRESSIONS

- Many studies have been performed to evaluate effects of various disinfectants on different types of impression materials
- Research findings have been contradictory
- No single disinfectant is compatible with all impression materials
- The least distortion is associated with products having the shortest contact times

IMPRESSIONS

- Many variables can affect impression materials
  - Composition and concentration of disinfe
  - Exposure time and compatibility of variou disinfectants with specific impression materials
  - Physical/chemical properties can vary in a given category of material or disinfectant
- Do an in-office “test run” when using new combinations of impression materials and disinfectants
- Consult dental materials’ manufacturers regarding their compatibility with disinfectants

DISINFECTING IMPRESSIONS

- Methods
  - Spraying, dipping, immersing
- Exposure time should be that recommended by the manufacturer of disinfectant for tuberculocidal disinfection
- Iodophors, sodium hypochlorite (1:10 concentration), chlorine dioxide, phenols, and other approved products are all acceptable

DISINFECTING IMPRESSIONS

- Polyether materials cannot be immersed in disinfectants due to potential for absorption and distortion
- Immersion disinfectants can only be used once before discarding (except for glutaraldehydes)
- Most reports indicate dimensional stability is not significantly affected by immersion technique

DISINFECTING IMPRESSIONS

- Clean and rinse impression in dental operatory
  - Cleaning efficiency can be improved by gently scrubbing impression with camel's hair brush and antimicrobial detergent
- Sprinkle dental stone into impression before rinsing to aid in cleaning
- Cleaning and rinsing
  - Reduces bioburden present
  - Lessens overall microbiologic challenge to disinfectant

DISINFECTING IMPRESSIONS

- Spray, dip, or immerse impression in appropriate intermediate- or high-level disinfectant and place in sealed bag
- Disinfection can be accomplished in the dental operatory or a professional work area depending on facility policy
- After required contact time, rinse impression and pour-up

SPRAY TECHNIQUE

- Rinse entire impression/tray under running tap water after removal from oral cavity
- Trim excess impression material from noncritical areas
  - Reduces number of microorganisms and organic debris present
- Place impression in bag and liberally spray the entire impression/tray
- Seal bag to create “charged atmosphere”
  - Reduces exposure to vapors and liquid

SPRAY TECHNIQUE

- Remove from bag at end of exposure time; rinse and pour
- Once stone has set, remove cast from impression
- Dispose of impression material and disposable tray (if applicable) in general waste
- Sterilize reusable tray (if applicable)

DIPPING/IMMERSION TECHNIQUE

- Select disinfectant with short exposure time to minimize distortion and deterioration of surface quality of resulting stone cast
- Follow same procedures as above except fully immerse or dip impression in disinfectant for recommended exposure time

SPRAY DISINFECTION -
Pros and Cons

- **Advantages**
  - **Uses less disinfectant**
  - **Same disinfectant can often be used to disinfect environmental surfaces**
- **Disadvantages**
  - **Probably not as effective as immersion**
  - **Can be released into air increasing occupational exposure**

DENTAL CASTS

- Very difficult to disinfect
- Is preferable to disinfect impression
- If casts must be disinfected:
  - Place casts on end to facilitate drainage
  - Spray with iodophor or chlorine product, then rinse
- Another option
  - Soak casts for 30 minutes in 0.5% concentration of sodium hypochlorite and saturated calcium dihydrate solution (SDS)
  - SDS is produced by placing uncontaminated, set gypsum (i.e. stone) in a container of water

ORALLY SOILED PROSTHESES

- Scrub with brush and antimicrobial soap to remove debris and contamination
  - Can be accomplished in operatory or professional work area
  - Sterilize brush or store in approved disinfectant
- Place prosthesis in sealable plastic bag or beaker filled with ultrasonic cleaning solution or calculus remover

ORALLY SOILED PROSTHESES

- Place in ultrasonic cleaner for required time as specified by manufacturer of ultrasonic cleaner
- Place cover on ultrasonic cleaner to reduce spatter potential
- Remove and rinse under running tap water, dry, and accomplish required work

SUB-SURFACE DISINFECTION

- Place prosthesis in sealable plastic bag containing 1:10 dilution of sodium hypochlorite or other intermediate- to high-level disinfectant (not glutaraldeyde or phenols)
- Place in ultrasonic cleaner for 10 minutes

DENTAL PROSTHESES

- Do not exceed manufacturer's recommended contact time on metal components to minimize corrosion
  - There is little effect on chrome-cobalt alloy with short-term exposures (10 minutes)
- Do not store in disinfectant before insertion
- Store in diluted mouthwash until insertion

WASTE

- Can include disposable trays, impression materials, and contaminated packing materials (if cannot be disinfected)
- Dispose of according to applicable federal, state, and local regulations
- Dispose of in general waste unless defined as regulated waste
- Only small amounts of regulated waste are generated in lab
- Sharps should be placed in puncture-resistant container

LATHE

- Ways to reduce risk of injury from aerosols, spatter, and macroscopic particles
  - Use protective eyewear
  - Ensure plexiglass shield is in position
  - Activate vacuum

LATHE

- Pumice has been shown to pose a potential contamination risk
  - Via aerosol or direct contact
- Mix pumice with
  - Clean water, diluted 1:10 bleach, or other appropriate disinfectant
  - Add tincture of green soap if desired

LATHE

- Change pumice daily
- Machine should be cleaned and disinfected daily
- No need for separate pans for new and existing prostheses if isolated properly
- At a minimum clean and disinfect pumice brushes and rag wheels daily. Daily heat sterilization is preferable.

STERILIZATION

- Heat sterilize all metal and heat-stable instruments that contact oral tissues, contaminated appliances, or potentially contaminated appliances should be heat sterilized after each use
  - Examples: facebow fork, metal impression trays, burs, polishing points, rag wheels, laboratory knives

IMPRESSION TRAYS

- Precleaning removes bioburden and any adherent impression material
- Ultrasonic cleaning can aid in removing residual set gypsum
- Chrome-plated or aluminum trays
  - Clean, package, heat sterilize
- Single-use trays
  - Discard after one use
- Custom acrylic trays
  - Can be disinfected (by spray or immersion), then rinsed (if to be used for second appointment)

DISINFECTION

- Prosthodontic items contaminated by handling should be disinfected (by spray or immersion technique based on type of item) after each use
  - Examples: alcohol torch, facebow, articulator, mixing spatula, mixing bowl, lab knife, shade/mold guide

WAX BITES/RIMS, BITE REGISTRATIONS

- Immersion disinfection may cause distortion to some items
  - Use spray disinfection
- Heavy-body bite registration materials
  - Usually not susceptible to distortion and can be disinfected in same manner as an impression of the same material

LAB EQUIPMENT

- Follow manufacturer instructions for:
  - Maintenance
  - Cleaning
  - Disinfection
  - Compatibility with disinfectants

ENVIRONMENTAL SURFACES

- Disinfection procedures should be comparable to procedures performed in the operatory
- Clean and disinfect daily or when visibly contaminated
- Use EPA-registered, tuberculocidal, hospital-grade disinfectant according to manufacturer instructions
  - Use utility gloves
- May use surface barriers to reduce the need to use disinfectants

PERSONAL HYGIENE

- Refrain from the following activities while in the lab where there is potential for occupational exposure:
  - Eating
  - Drinking
  - Smoking
  - Applying cosmetics or lip balm
  - Handling contact lenses

SPECIAL CONSIDERATIONS

- For porcelain restorations that are characterized intraorally
  - Take them directly to porcelain furnace
  - Sintering process sterilizes restoration
  - No need for separate cleaning/disinfection process
  - Monitor procedures closely to ensure proper cleaning/disinfection of equipment and areas that may become contaminated during the process

SUMMARY

- Dental lab presents numerous challenges to IC
- Lab personnel are at risk of occupational exposure to BBPs
- Disease transmission from contaminated items entering the lab can be prevented

SUMMARY

- Best safeguards
  - Adherence to SP at all times
  - Hepatitis B vaccine
  - Implementation of aseptic techniques
  - Use of PPE, unit-dosing of materials, barriers
  - Use of appropriate sterilization and disinfection procedures

SUMMARY

- All IC activities are designed to accomplish one goal
  - Break the link in the chain of infection
- Want to interrupt potential for person-to-person transmission of infection
- Processes must be performed consistently and routinely to be effective
- Requires communication and coordinated effort between lab and dental office
  - Redundancies must be identified and minimized

References

- CDC. Guidelines for infection control in dental health-care settings – 2003. MMWR 2003; 52(No. RR-17):1–66. Available at www.cdc.gov/oralhealth/infectioncontrol.
- USAF Guidelines for Infection Control in Dentistry, September 2004. Available at www.brooks.af.mil/dis/infcontrol.htm.